



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/921,786	08/06/2001	Bernard Drevillon	000348-280	7374

7590

08/12/2003

E. Joseph Gess
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, VA 22313-1404

EXAMINER

ORTIZ RODRIGUEZ, CARLOS R

ART UNIT	PAPER NUMBER
----------	--------------

2125

DATE MAILED: 08/12/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application

09/921,786

Examiner

Carlos Ortiz-Rodriguez

Applicant(s)

DREVILLON ET AL.

Art Unit

2125

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kildemo et al., "Real time control of the growth of silicon alloy multilayers by multiwavelength ellipsometry"; Thin Solid Films, Vol. 290-291; Dec. 1996; pages 46-50, in view of M. Kildemo et al., "A direct robust feedback method for growth control of optical coatings by multiwavelength ellipsometry"; Thin Solid Films, Vol. 313-314; Dec. 1998; pages 484-489.

With respect to claim 1, Kildemo et al. (pub date 1996) discloses a method for real-time control of the fabrication of a thin-film structure comprising a substrate by ellipsometric measurement(see abstract lines 1 and 2)

in which: variables directly linked to the ellipsometric ratio $\rho = \tan \Psi \exp(i\Delta)$ are measured(see pg.47, col.1 line 10);

and the said variables are compared with reference values(see pg.46, col.2 lines 3 and 4).

But, Kildemo et al. (pub date 1996) fails to clearly disclose details regarding the length of the path traveled at a time t in the plane of the variables with respect to an initial point at time $t_{sub.0}$, for each layer participating in the thin-film structure.

Art Unit: 2125

However, M. Kildemo et al. (pub. 1998) discloses that the comparison relates to the length of the path traveled at a time t in the plane of the variables with respect to an initial point at time $t_{sub.0}$, for each layer participating in the thin-film structure (see pg. 486 col.1 lines 23-bottom of page).

Therefore at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above invention suggested by Kildemo et al. (pub date 1996) and combining it with the invention disclosed by M. Kildemo et al. (pub. date 1998). The results of this combination would lead to, method for real-time control of the fabrication of a thin-film structure by elliptometric measurement.

One of ordinary skill in the art would have been motivated to do this combination because it is common in the art to use the length of the path traveled to determine the end of the i th layer as disclosed by Kildemo et al. (pub date 1996).

With respect to claim 2-10, 12-27 and 30-31, Kildemo et al. (pub date 1996) in combination with M. Kildemo et al. (pub. date 1998) disclose all the limitations regarding base claim 1. Kildemo et al. (pub date 1996) further discloses:

- a control method, characterized in that the said variables are a combination of the parameters Ψ and Δ . (see equation 1) .

Art Unit: 2125

- a control method, characterized in that the said variables are a combination of trigonometric functions of the parameters Ψ and Δ . (see equation 1).
- a control method, characterized in that the ellipsometric measurement is one with phase modulation (see pg.50, col.2 line 9).
- a control method, characterized in that the measured variables are, respectively:
 $I_{\text{sub.s}} = (\sin 2\Psi \sin \Delta)$ and $I_{\text{sub.c}} = (\sin 2\Psi \cos \Delta)$ or $I_{\text{sub.c}} = \cos 2\Psi$. (see pg.47, col.1, equation 1).
- a control method, characterized in that the ellipsometric measurement is carried out using the method called "rotating polarizer" method (see Fig 1).
- a control method, characterized in that the measured variables are $\tan \Psi$. (see pg.47 line 10) and $\cos \Delta$. (see equation 1, also see Fig. 1).
- a control method, characterized in that the ellipsometric measurement is a multiwavelength measurement (see abstract line 1).
- a control method, characterized in that the reference values form a theoretically determined path (see Fig 5).

Art Unit: 2125

- a control method, characterized in that the reference values form an experimentally determined path (see pg 46, col.2 line 4).
- the reference values are determined by measurement, using measurement of known layers and of the thin-film structure to be controlled(see page 46 col 1 paragraph 2,

Regarding claims 11,28 and 29, Kildemo et al.(pub date 1996) in combination with M. Kildemo et al. (pub. date 1998) disclose all the limitations regarding base claims 1,2 and 3. M. Kildemo et al. (pub date 1998) further discloses: the reference values are discrete points corresponding to the instants of fabrication of the thin layers with respect to the time t_0 (see fig 1).

Regarding claims 13,32 –33, Kildemo et al.(pub date 1996) in combination with M. Kildemo et al. (pub. date 1998) disclose all the limitations regarding base claims 1,2 and 3. M. Kildemo et al. (pub date 1998) further discloses that the reference values are determined by measurement, using measurement of known layers and of the thin-film structure to be controlled(see page 484 introduction lines 9-16 and page 485 col 1 third paragraph.)

Response to Arguments

Applicant's arguments filed 6/13/03 have been fully considered. Regarding the criteria used to decide the termination of layers, M. Kildemo et al. (pub. date 1998) discloses measuring the length of the trajectory traveled in the plane of the variables $[I_s, I_c]$.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to method for real-time control of the fabrication of a thin-film structure by ellipsometric measurement:

- a. U.S. Pat. No. 5,608,526 to Piwonka-Corle et al., which discloses a focused beam spectroscopic ellipsometry method and system.
- b. U.S. Pat. No. 5,706,212 to Thompson et al., which discloses infrared ellipsometer/polarimeter system, method of calibration, and use thereof.
- c. U.S. Pat. No. 5,910,842 to Piwonka-Corle et al., which discloses a focused beam spectroscopic ellipsometry method and system.
- d. U.S. Pat. No. 6,381,008 to Branagh et al., which discloses a method and system for identifying etch end points in semiconductor circuit fabrication.

The following publications are cited to further show the state of the art with respect to method for real-time control of the fabrication of a thin-film structure by ellipsometric measurement:

Art Unit: 2125

e. U.S. Pub. No. 2002/0024668 to Stehle et al., which discloses a method and apparatus for ellipsometric metrology for a sample contained in a chamber or the like.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Ortiz-Rodriguez whose telephone number is (703) 305-8009. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard can be reached on (703) 308-0538. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-6606.

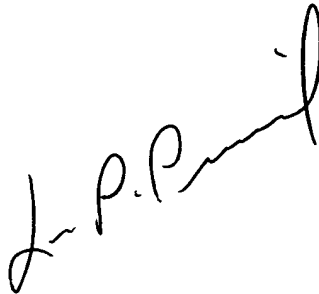
Art Unit: 2125

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.

Carlos Ortiz-Rodriguez
Patent Examiner
Art Unit 2125

cror

August 4, 2003

A handwritten signature in black ink, appearing to read "L. Picard", written diagonally across the page.

LEO PICARD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100